



## Is a specific drinking pattern a consistent feature of the Mediterranean diet in Spain in the XXI century?

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**Abstract** *Background and aim:* Over the last 50 years, people in Spain have increasingly been eating their main meal away from home and are shifting from the typical Mediterranean diet (MD). In addition, wine consumption has decreased whereas beer intake has risen. Consequently, it is uncertain if the *Mediterranean drinking pattern* (MDP; moderate alcohol intake mainly from wine and during meals) is a habitual feature of the MD today.

*Methods and results:* Cross-sectional study conducted from 2008 to 2010 among 8894 individuals representative of the Spanish population aged 18–64 years. Consumption of alcoholic beverages and food was collected with a validated diet history. Accordance with the MD was defined as a score  $\geq 8$  on the Mediterranean Diet Adherence Screener (MEDAS) or  $\geq 5$  in the Trichopoulos index (after excluding alcohol intake from both indices). Among individuals with MEDAS-based MD accordance, only 17.1% had a MDP. After adjustment for potential confounders, this drinking pattern showed a weak association with higher MD accordance (odds ratio (OR) 1.32; 95% confidence interval (CI) 1.12–1.57). Only 14.7% of those with Trichopoulos-based MD accordance had a MDP; this pattern showed an even weaker association with higher MD accordance (OR 1.17; 95% CI 1.01–1.36). Similar results were obtained when this drinking pattern was redefined to include persons who drank wine with or outside of meals, as well as those who were primarily beer drinkers.

*Conclusions:* The MDP is not a habitual feature of the MD in the early XXI century in Spain.

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### Introduction

The traditional Mediterranean diet (MD) represents the food patterns typical of olive-growing areas of the Mediterranean region in the early 1960s [1]. This diet is characterized by an abundance of plant foods, use of olive oil as

the principal source of fat, consumption of low to moderate amounts of dairy products, fish and poultry, and low amounts of red meat. Although alcohol intake is considered optional, moderate consumption of alcoholic beverages, mainly wine during meals, has been regarded as a typical feature of the traditional MD in Southern Europe [1].

Alcohol may play an important role within the MD because there is evidence that moderate alcohol consumption is associated with lower cardiovascular (CV) risk and reduced all-cause mortality [2]. Moreover, one study

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has suggested that alcohol is the most important contributor to the health benefits of the MD [3]. Accordingly, updated formulations of the MD include daily moderate consumption of wine and other fermented beverages (one glass per day for women and two glasses per day for men) during meals [4].

Over the last 50 years, Spain has experienced rapid socioeconomic development accompanied by large internal migrations from rural to urban areas, the progressive incorporation of women to paid work, and globalization of the food market [5]. Moreover, an increasing proportion of the population eats the main meal away from home [6], consumes food rich in saturated fat, added sugar, and salt [7], and is shifting from the MD [8]. Lastly, the consumption of wine has shown a substantial decline, but the consumption of beer has increased [9,10]; of note, however, is that Spain shows the highest consumption of nonalcoholic beer in Europe, representing about 10% of the total beer intake [11]. As a result of these changes in life conditions and food habits, it is uncertain if the *Mediterranean drinking pattern* (MDP; moderate alcohol intake mostly from wine during meals) [4] is a habitual feature of the MD today.

Accordingly, in a sample of the Spanish population at the beginning of the XXI century, this manuscript examined the association between different patterns of alcohol consumption and the degree of accordance of the dietary habits with the MD; specifically, it assessed whether the MDP is associated with better accordance with the MD.

## Methods

### Study design and participants

Data were taken from a cross-sectional study conducted from June 2008 to October 2010 with 12,948 individuals selected by stratified cluster sampling from the noninstitutionalized Spanish population aged 18 years and older [12]. Study participants gave informed written consent. The study protocol was approved by the Ethics Research Committee of the “La Paz” University Hospital in Madrid and the Hospital Clinic in Barcelona.

### Study variables

Consumption of food and beverages in the preceding year was estimated using a computerized diet history, developed from the one used in the EPIC cohort study in Spain [13].

### Patterns of alcohol consumption

We assessed several alcohol drinking patterns, including regular (average) intake, binge drinking, beverage preference, and drinking with meals [14,15]. Regular drinkers were classified as nondrinkers (lifetime abstainers and occasional drinkers), ex-drinkers, moderate drinkers, or excessive drinkers. The threshold between moderate and excessive alcohol intake was set at  $\geq 40$  g/day in men and  $\geq 24$  g/day in women [15].

Among drinkers, binge drinking was defined as the intake of  $\geq 80$  g of alcohol in men and  $\geq 60$  g in women at any given drinking session (the entire evening or night) during the preceding 30 days [14]. A preference for a specific type of alcoholic beverage (wine, beer, or spirits) was deemed to exist when such drink accounted for over 80% of alcohol intake [15]. Consumption of alcohol with meals (lunch or dinner) was used to classify drinkers into three groups: only with meals, only outside of meals, and with or outside of meals [15].

Lastly, a MDP was defined as moderate intake of alcohol (without binge drinking), with wine preference, and alcohol consumption only with meals [1,4].

### Diet accordance with the MD

Accordance with the MD was evaluated with two instruments: the Mediterranean Diet Adherence Screener (MEDAS) [16,17] and the Trichopoulou index [18]. The MEDAS consists of 14 targets for food consumption (Suppl. Table 1), and one point is given for each target achieved. As one of the items refers to wine consumption (target:  $\geq 100$  ml/day;  $\geq 12$  g/day of alcohol), we removed it from the calculation of the score; thus the total MEDAS score ranged from 0 to 13, with a higher score indicating better MD accordance. We considered that a MEDAS score  $\geq 8$  represented good accordance with the MD [8].

In the Trichopoulou index, the intake of vegetables, legumes, fruits and nuts, cereals, and fish is considered beneficial, thus a value of 1 is assigned to consumption above the sex-specific median in the study sample; by contrast, intake of red meat, poultry, and dairy products is considered detrimental, and a value of 0 is assigned to consumption above the median. As above, consumption of alcohol (1 point for 10–50 g/day in men and 5–25 g/day in women) was removed from the scale so that its range was 0–8. We defined MD accordance as a score  $\geq 5$  (the uppermost tertile in the study sample) in the Trichopoulou index.

### Potential confounders

Information was also collected on variables which are associated with both drinking patterns and MD accordance (left column in Table 1) [8,14,15]. Weight and height were measured under standardized conditions [12]; body mass index (BMI) was calculated as weight in kg divided by squared height in m.

### Statistical analysis

In older adults, the low frequency of some alcohol drinking patterns (e.g., binge drinking, consumption of spirits, and drinking outside of meals) precludes a meaningful examination of the association between drinking patterns and diet. Thus, of the 12,948 participants, we selected 10,329 individuals aged 18–64 years. Of these, we excluded 1364 persons who lacked valid data on alcohol consumption and diet, and 71 without data on other variables. As a result, the analyses were conducted with 8894 individuals (of these, 5209 were alcohol drinkers).

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